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AGRICULTURAL PUBLIC SPENDING AND IMPULSE RESPONSE FUNCTIONS

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ABSTRACT

This article assesses the impact of public agricultural expenditure on real agricultural value added in Mali. Economic shocks and causes allow the state to adopt an appropriate agricultural policy response to avoid agricultural health consequences. To achieve this, the Vector autoregression (VAR) model was used to estimate the function. The data processing process was done with Stata 2016 software. At the end of the results, the VAR model reveals that the active agricultural population is a significant variable that positively impacts the real agricultural added value and agricultural equipment. In addition, current agricultural expenditure and agricultural equipment are not significant, but the agricultural equipment variable has a positive influence on the agricultural area. The real agricultural added value is significant and has a positive impact on agricultural equipment. It is also noted that the real agricultural added value, the area, the population, the agricultural equipment respectively causes the increase in the active agricultural population, the use of agricultural equipment and the real agricultural added value. The increase in real agricultural added value is due 100% to its own innovations during the first 4 years and 40% on average will come from current agricultural expenditure, area, labor force and agricultural equipment over the horizon of 21 years old.
Keywords: Agricultural public investment, Agricultural value added, Impulse responses, VAR model.

1. INTRODUCTION

The contribution of the agricultural sector to GDP represented 40.96% on average over the 2015 period (BM, 2015). It plays an important role in GDP according to the annual trend of the sub-sectors that compose it. Thus, between 2005 and 2010, the GDP of the crop production sub-sector (agriculture) increased overall by 12.12% against 9.15% (2010-2017). There is a decrease of 18.18% for livestock against an increase of 13.23% (2010-2017). There is also a decrease of 27.27% for forestry against a decrease of 23.12% (2010-2017). We observe 0% for fishing against an increase of 4.35% (2010-2017) (BM, 2012; Africa data base and INSTAT, cited by Bourdet, Dabitao and Dembélé, 2011; PNISA, 2014). The contribution of the agriculture sector to Mali's gross domestic product is constantly fluctuating, which sometimes slows down the performance of its economy. However, according to several authors, namely

Cette G. (2007), Kahneman & Krueger (2006), McGillivray & Shorrocks (2005), Obsberg & Shape (2005) […] agree that gross domestic product is the indicator most often used to apprehend the level of development of a country and the sectors of activity of the nations.

2. Problem of Malian agricultural productivity

The good growth of the Malian agricultural sector at times should not hide the productive weakness of this sector. First of all, according to the Ministry of the Environment and Sanitation (MEA, 2011), Malian agriculture is extensive and not very productive resulting from a number of factors, in particular: dependence on climatic hazards and rainfall in down 30% over the past 30 years. For Fané (2016), droughts and floods as well as regular locust invasions weaken the productivity of Malian agriculture. A group of Malian researchers is studying the potential of agroindustrial poles and places the lack of adequate production infrastructure in particular as a major problem followed by the low level of irrigation in production pockets (Agropole, 2013). According to the national plan for investment in the agricultural sector (PNISA, 2011), the low productivity of Malian agriculture is linked to difficulties in accessing inputs (land, fertilizer) and credit, thus blocking agricultural investments. The monitoring of agricultural and food policies in Africa (SPAAA, 2013) highlights the low level of education of producers. For the "Monitoring African Food and Agricultural Policies project methodology: concept paper" (FAO, 2016), notes that agricultural extension and research very often do not reach the actors of the sector before emphasizing the high cost mechanism transport, loss during the transaction and packaging of agricultural products. According to the statistical planning unit of Mali (CPS, 2011), the low productivity of Malian agriculture is linked to poverty and the fragility of the soil, which leads to a general deterioration of natural resources. As for Diakité L & Koné B (2010), the vulnerability of this agriculture faces price volatility on the domestic and international market. According to NEPAD (2006, 2008); World Bank (2008), low agricultural productivity in Africa in general and in Mali in particular is characterized by low public spending in the sector in general, particularly investment spending (for unsuitable support from subsidies) and by the poor organization of actors in the sector. In conclusion, the Malian economy is highly dependent on agricultural activities, the levels of production and agricultural productivity of which are still globally dependent on several hazards. However, although agriculture is the engine of the Malian economy, many production difficulties reduce the efficiency of this sector. “Such a face of the economy in the presence of a rapidly growing rural population is mainly reflected in strong fluctuations in GDP and increased impoverishment of the population” (SPAAA, 2013).

Table 1 Overall increase in production of the entire agricultural sector

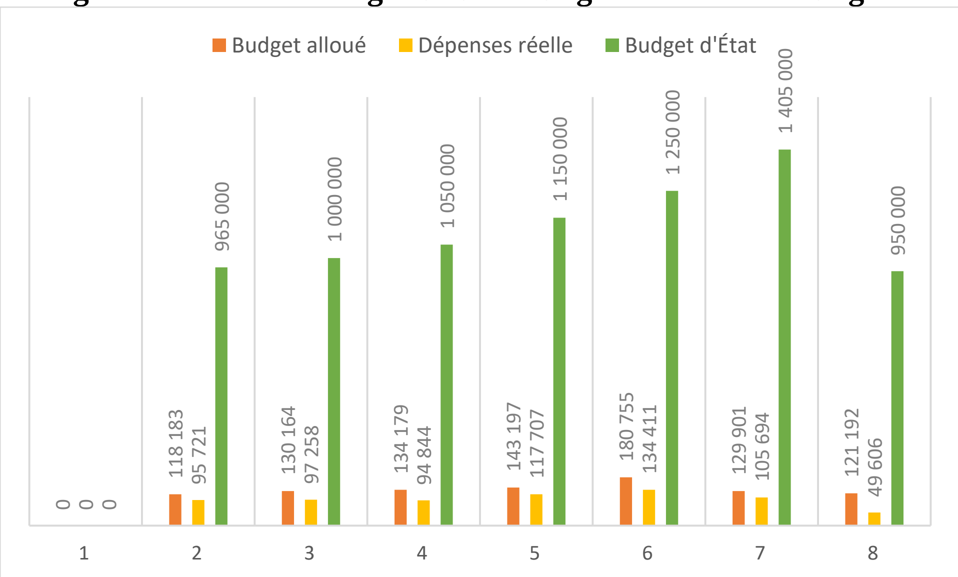
	Overall increase from 2005-2010	Overall increase from 2010-2017
Vegetable production	**12,12 %**	**9,15 %**
Breeding	**-18,18 %**	**13,23 %**
Forestry	**27,27 %**	**23,12 %**
Sin	**0 %**	**4,35**

Source: Constructed by the author using data from FAO, Countrysat, WB (2016).

3. Experimental framework of the investment strategy in the Malian agricultural sector

In terms of public investments in the agricultural sector, the government of Mali uses the Medium-Term Budgetary Framework (MTBF), which is a budgetary tool from which the finance bill is formulated. It makes it possible to provide a technical response to the problems of articulation between development strategies and the State budget and also makes it possible to situate the finance law in a multi-annual perspective and to specify the trajectory of public finances. The objective of fiscal policy is thus to strengthen the sustainability of fiscal policy in line with the WAEMU and ECOWAS convergence criteria and public debt sustainability constraints. Public interventions in the agricultural sector in Mali are determined by sector and sub-sector policies and strategies, accompanied by programs and action plans. The sector has three (3) main reference documents which are: The agricultural orientation law (LOA) promulgated on September 5, 2006, integrates all the policies and strategies of the agricultural development sector and sets the framework for long-term orientations; the strategic framework for growth and poverty reduction (CSCRP) adopted by the Government in 2006 is the single medium-term reference framework for the period 2007-2011 integrating the Millennium Development Goals (MDGs); the economic and social development project (PDES) whose agricultural component forms the basis of government work to improve production and productivity as well as governance in the agricultural sector. This desire was reflected in the development and adoption of the plan for transition to the sectoral approach for rural development (PASDR) through the development of an agricultural development policy (PDA) in 2013 and a program investment in the agricultural sector (PNISA, 2014). The macroeconomic framework on which Mali's budgetary framework is built is based on the assumptions of the evolution of the international and sub-regional economic environment as well as those of the growth sectors of the Malian economy. The specific assumptions on the national economy are based on the continuation of the policy of support to the primary sector through the subsidy of agricultural inputs and agricultural mechanization (public agricultural expenditure). In terms of implementation, the financing of agriculture in Mali goes through two channels, operating expenses and investment expenses. Operating expenses are all expenses incurred for salaries and for the day-to-day activities of the departments in charge of agriculture. Investment expenditure concerns expenditure made for the acquisition and installation of agricultural infrastructure. The sector's investment budget is characterized by the implementation and continuation of major rural development projects.

Histogram 1 Share of the agricultural budget on the State budget



Source: Constructed by the author using data from FAO, Countrysat, WB.

Lately, short-term measures, such as variable input subsidies or the removal of import taxes have received a lot of political attention. Long-term measures, however, are also important for a sustainable increase in production. They could include increasing production incentives, increasing producer income through higher prices, and reducing vulnerability to external shocks. Namely, the value chains are very poorly organized by the players in the sector who apply excessive margins. As a result, domestic prices are disconnected from international and regional prices. Consequently, it will be necessary to take into account the medium-term consequences of measures such as the abolition of import taxes or export restrictions, since they have a direct effect on producer prices and can compromise income and production incentives. Indeed, the agricultural problem is difficult to apprehend. If we ask the stakeholders following the question, what is the problem of the agricultural sector? It is not surprising or surprising to receive different answers depending on the function that the interviewee performs. According to the farmer, the agricultural problem lies in the low income for the producer, the housewife agrees to denounce the price level of the products, the politician deplores for his part the importance of the public expenditure engaged in the agricultural sector. They all tend to reduce the agricultural problem to its effects, and leave us perplexed by an often-contradictory catalogue, which does not respond to our desire to understand the why and the how... The first thing to do in the analysis of agricultural policies will consist in widening our field of vision. With regard to the agricultural problem of sub-Saharan Africa in general and Mali in particular, several authors denounce a notorious deficit in agricultural policy, characterized by the weakness of public agricultural expenditure (Diagne Youssoupha S. & SY H. and Thiam D., 2014). This is why we made an inventory of agricultural policies and analyzed the root causes of agricultural productivity on the growth of real agricultural added value.

Table 2 Detailed composition of specific expenditure on agriculture and food

Detailed breakdown of specific expenditure on agriculture and food in Mali (%), 2006-2012	
Évolution en % de 2006-2012	
Payments to producers — input subsidy	37 %
Payments to producers — income support	1 %
Agricultural research	2 %
Popularization	1 %
Agricultural training	10 %
Agricultural infrastructure	22 %
Payments to other agents	2 %
Payment to consumers	1 %
Technical assistance	3 %
Inspection (animal and plant)	7 %
Storage	4 %
Marketing	10 %

Source: constructed by the author using data from SAPAA, 2014

4 METHODOLOGY AND RESULTS OBTAINED

The VAR method was chosen to assess the influence of the composition of public agricultural expenditure on Mali's real agricultural value added in the short and long term. Our sample is presented below with the variables retained for our application under the Stata 2016 software. The application of this method of analysis in the Malian agricultural sector and the region is innovative and topical.

4.1 VAR model

The initial function to be estimated is written as follows**:**

$$vaar_{it} = f(a_{it}, pop_{it}, sup_{it}, equi_{it}, def_{it},) \qquad (1)$$

It is based on a study carried out by FAO (1994). In logarithmic form, we get:

$$lnvaar_{it} = a_{it} + \beta_2 lndepf_{it} + \beta_5 lnequi_{it} + \beta_6 lnsup_{it} + \beta_7 lnpop_{it} + \varepsilon_{it} \qquad (2)$$

The variables are put in natural logarithm with the intention of being able to directly obtain the estimated coefficients in terms of elasticity, and also to reduce the weight of the extreme variables like pop, sup [...] in order to improve the performance of the econometric estimations of the model.

4.1.1 Specification of the VAR model

From its conception, the VAR model is based on the assumption that the evolution of the economy is closely approximated by the description of the dynamic behavior of a vector of n variables that depend linearly on the past (Sims, 1980).
The variables retained in this second model are among others (lnvaar, lndepfit, lnsup, lnpop, lnequi). The same variables of the first model (ARDL) were therefore retained here, and we had also considered, for the modeling by a VAR model, except for the variable (Indepinvit). All variables were taken as logarithms of the VAR model corresponding to exponential growth. We conducted tests of the stationarity hypothesis on these different variables using the Dickey-Fuller tests (1979, 1981). They led to accepting the hypothesis of an order of integration equal to 1 and of order 2 for the variable (lnequi). In this second regression, the determination of the number of lags retained is (4) (appendix 5). The initial function to be estimated is written as follows:

$$\boldsymbol{vaar_{it} = f(A_{it}, pop_{it}, sup_{it}, equi_{it}, def_{it},)} \qquad (\mathbf{1})$$

It is based on a study carried out by FAO (1994). In logarithmic form, we get:

$$\boldsymbol{lnvaar_{it} = A_{it} + \beta_2 lndepf_{it} + \beta_5 lnequi_{it} + \beta_6 lnsup_{it} + \beta_7 lnpop_{it} + \varepsilon_{it}} \qquad (\mathbf{2})$$

4.2 Estimation result of the VAR model (4)

4.2.1 Stationarity tests of variables

Examining the properties of the variables is important because if one or more variables in the regression model are nonstationary, then the standard errors produced by the regression estimate will be biased. The properties of the model variables are examined by the augmented Dickey-Fuller (1981) unit root test and became stationary after the first and second difference for the variable equi (P-value=0.0278) as shown in the table (Table 3).
The decision rule is as follows:

- If the probability P-value > at the threshold, we accept H0 the process is not stationary.
- If the probability P-value < the threshold we reject H0 the process is stationary.cf. Doucouré (2008).

Table 3 Study of stationarity at variable level with the ADF test

Variables	P-value	Threshold	Decisions
Lnvaar	0,7882	5%	Not stationary
Lndepinvit	0,3090	5%	Not stationary
Lndepfit	0,3211	5%	Not stationary
Lnsup	0,3025	5%	Not stationary
Lnpop	0,3303	5%	Not stationary
Lnequi	0,9686	5%	Not stationary

Source: constructed by the author, extracted from the regression in Stata 2016 using data from FAO, Countrysat, WB.

The P value is above the threshold (5%) for all variables. We conclude that none of the variables of the model is not stationary at level. The application of unit root ADF tests on the studied series shows that all the variables are not stationary at the level. This leads to rejecting the stationarity hypothesis for all level series. Since the variables are non-stationary in level, we move on to first difference tests.

Table 4 the first difference stationarity of the variables with the ADF test

Variables	P-value	Threshold	Décisions
Lnvaar	0,0020	5%	Stationary
Lndepinvit	0,0118	5%	Stationary
Lndepfit	0,0207	5%	Stationary
Lnsup	0,0000	5%	Stationary
Lnpop	0,0040	5%	Stationary
Lnequi	0,8549*	5%	Not stationary

Source: constructed by the author, extracted from the regression in Stata 2016 using data from FAO, Countrysat, WB.

NB: *: equi is stationary in second difference of P-value=0.0278. On the other hand, the P value is below the threshold (5%) for all the variables. The variables are therefore all stationary in first difference except for the variable equi, stationary in different seconds. The application of unit root ADF tests on the series studied leads to the rejection of the stationarity hypothesis for all the series at level. On the other hand, it is therefore useful to conclude that all the variables are integrated in the order I (1) and I (2) for the variable equi. Therefore, we had determined the number of delays and for the choice of the number of delays retained, we used the Akaike information criterion (AIC) to apply to the ARDL model (4 4 4 1 1 2). We used ARDL modeling to assess the influence of public agricultural expenditure on the growth of real agricultural value added. This is because the ARDL test does not require the model variables to be purely I (0) or I (1). It is also a technique that offers the possibility of jointly dealing with long-term dynamics and short-term adjustments. Also, we have adopted this approach to assess the impact of the composition […] of public agricultural expenditure on real agricultural value added (Vaar).

4.2.2 Determining the number of delays

We chose the Akaike Information Criterion (AIC) among several statistical criteria to determine the value of the number of lags of a stepped lag model, i.e. the maximum period of influence of the explanatory series.

Table 5 Determination of the number of delays

Variables	PPE	AIC	HQIC	Delay retained
Lnvaar	**4***	**4***	**4***	**4***
Lndepinvit	**4***	**4***	**4***	**4***
Lndepfit	**4***	**4***	**4***	**4***
Lnsup	**1***	**1***	**1***	**1***
Lnpop	**1***	**1***	**1***	**1***
Lnequui	**2***	**2***	**2***	**2***

Source: constructed by the author using data from FAO, WB, Countrysat under Stata 2016.

NB: * = rank chosen

This subsection presents the summary of the estimation results. The results are obtained using the Stata2016 software. The interpretation of the results of the estimation remains essential if one wants to know the true meaning of the estimated coefficients, to ensure their significance and to formulate relevant macroeconomic policy recommendations.

At the end of this subsection, the results reveal that the active agricultural population is a significant variable that positively impacts the real agricultural value added and on agricultural equipment. As for agricultural equipment, it is a non-significant variable, but it has a positive influence on the agricultural area. Current agricultural expenditure is insignificant, but it leads to a positive shock on itself. The real agricultural added value is significant and has a positive impact on agricultural equipment (VAR estimation table (4) below). We present below the real causes and the approximate percentages of the shocks in the following lines.

Table 6 VAR (4) model estimates

. var lnvaar lndepfit lnsup lnpop lnequi,lags(4)

Vector autoregression

Sample: 1994 - 2016		Number of obs	=	23
Log likelihood =	145.1064	AIC	=	-10.00925
FPE =	3.29e-11	HQIC	=	-9.636766
Det(Sigma_ml) =	2.28e-12	SBIC	=	-8.528174

Equation	Parms	RMSE	R-sq	chi2	P>chi2
lnvaar	6	.027536	0.4945	22.49925	0.0004
lndepfit	6	.323607	0.3274	11.19703	0.0476
lnsup	6	.223693	0.7400	65.47079	0.0000
lnpop	6	.018485	0.9319	314.6493	0.0000
lnequi	6	.214013	0.4663	20.09804	0.0012

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnvaar						
lnvaar L4.	.4343062	.2757116	1.58	0.115	-.1060787	.9746911
lndepfit L4.	-.0327161	.0179543	-1.82	0.068	-.0679058	.0024737
lnsup L4.	-.0379564	.0221446	-1.71	0.087	-.0813591	.0054462
lnpop L4.	.4532652	.1370673	3.31	0.001	.1846182	.7219122
lnequi L4.	.0932691	.0553688	1.68	0.092	-.0152517	.2017899
_cons	.2520089	1.038061	0.24	0.808	-1.782554	2.286572
lndepfit						
lnvaar L4.	5.359004	3.240206	1.65	0.098	-.9916833	11.70969
lndepfit L4.	-.4671514	.2110016	-2.21	0.027	-.8807069	-.0535958
lnsup L4.	.023122	.260247	0.09	0.929	-.4869527	.5331968
lnpop L4.	-.9854181	1.610837	-0.61	0.541	-4.1426	2.171764
lnequi L4.	-.3501381	.6507024	-0.54	0.591	-1.625491	.9252152
_cons	-11.24904	12.19946	-0.92	0.356	-35.15953	12.66146
lnsup						
lnvaar L4.	2.694068	2.239786	1.20	0.229	-1.695833	7.083968
lndepfit L4.	.138391	.1458545	0.95	0.343	-.1474785	.4242605
lnsup L4.	-.0934886	.1798953	-0.52	0.603	-.4460768	.2590996
lnpop L4.	3.977546	1.113488	3.57	0.000	1.79515	6.159943
lnequi L4.	-1.363661	.4497968	-3.03	0.002	-2.245247	-.4820758
_cons	-13.49774	8.432853	-1.60	0.109	-30.02583	3.030345
lnpop						
lnvaar L4.	-.1878564	.1850821	-1.01	0.310	-.5506106	.1748979
lndepfit L4.	.0019555	.0120525	0.16	0.871	-.021667	.025578
lnsup L4.	.0222248	.0148654	1.50	0.135	-.0069109	.0513605
lnpop L4.	.5271386	.0920117	5.73	0.000	.3467988	.7074783
lnequi L4.	-.0705057	.0371684	-1.90	0.058	-.1433545	.0023431
_cons	2.568413	.6968388	3.69	0.000	1.202635	3.934192
lnequi						
lnvaar L4.	6.633244	2.142861	3.10	0.002	2.433314	10.83317
lndepfit L4.	-.2516275	.1395427	-1.80	0.071	-.5251262	.0218712
lnsup L4.	.0367608	.1721104	0.21	0.831	-.3005694	.374091
lnpop L4.	1.842452	1.065302	1.73	0.084	-.2455024	3.930406
lnequi L4.	.1313588	.4303321	0.31	0.760	-.7120767	.9747943
_cons	-25.82039	8.067926	-3.20	0.001	-41.63324	-10.00755

Source: constructed by the author, extracted from the regression in Stata 2016 using data from FAO, Countrysat, WB.

4.2.3 Causality test between variables

The causality test is essential since the causality relationships relate information on the anteriority of the events between the different variables. This is the principle of anteriority, the cause precedes the effect and secondly, the causal series contains information on the effect, which is not contained in any other series, in the sense of the conditional distribution. The classic test, for this purpose, is that of Granger (1969), the theorem is based on the value of the forecasts of the variables. We accept the null hypothesis (non-causality) as soon as Prob is greater than 5%.

Table 7 Causality test1

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. vargranger
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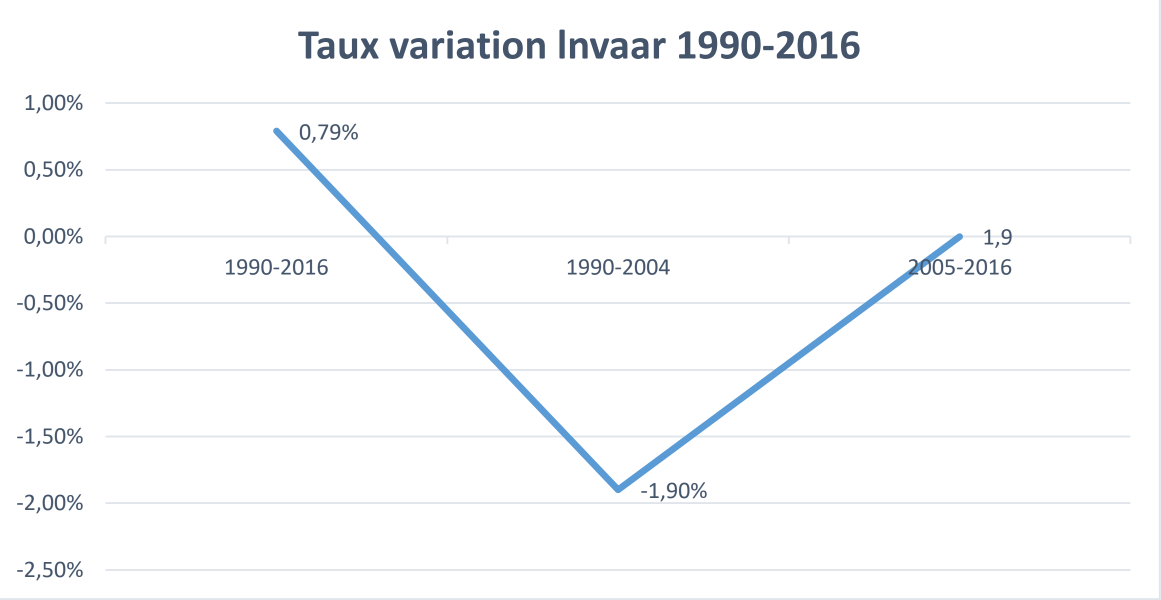
Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
lnvaar	lndepfit	3.3204	1	0.068
lnvaar	lnsup	2.9379	1	0.087
lnvaar	lnpop	10.935	1	0.001
lnvaar	lnequi	2.8376	1	0.092
lnvaar	ALL	17.623	4	0.001
lndepfit	lnvaar	2.7354	1	0.098
lndepfit	lnsup	.00789	1	0.929
lndepfit	lnpop	.37423	1	0.541
lndepfit	lnequi	.28954	1	0.591
lndepfit	ALL	7.732	4	0.102
lnsup	lnvaar	1.4468	1	0.229
lnsup	lndepfit	.90028	1	0.343
lnsup	lnpop	12.76	1	0.000
lnsup	lnequi	9.1914	1	0.002
lnsup	ALL	22.855	4	0.000
lnpop	lnvaar	1.0302	1	0.310
lnpop	lndepfit	.02633	1	0.871
lnpop	lnsup	2.2352	1	0.135
lnpop	lnequi	3.5983	1	0.058
lnpop	ALL	21.968	4	0.000
lnequi	lnvaar	9.5822	1	0.002
lnequi	lndepfit	3.2516	1	0.071
lnequi	lnsup	.04562	1	0.831
lnequi	lnpop	2.9912	1	0.084
lnequi	ALL	18.063	4	0.001

Source: constructed by the author, extracted from the regression in Stata 2016 using data from FAO, Countrysat, WB.

The real agricultural value added causes the increase in the active agricultural population. This is because agriculture is the main source of income and occupies 70% of the population. Otherwise, this result explains that the real agricultural added value generated by agriculture encourages the population to invest in this sector of activity. We see the opposite effect in continents and countries with intensive production such as America and Europe (Laurent C., 2018). Agricultural current expenditures in the administrations have no significant effect on the real agricultural value added and on the other variables. Indeed [public finances were used specifically to support public services] and public spending has proven to be inelastic in having a positive impact on vaar. Because it only consisted of taking charge of the administrative operation. The agricultural area causes the increase in the agricultural population and the use of agricultural equipment. According to the Keynesians, this transmission mechanism of budgetary policies could take place according to two mechanisms. Namely, the mechanism through direct effects coming from an increase in public expenditure (themselves) or an increase in private expenditure by citizens as a result of tax cuts. Otherwise, via indirect effects from increased consumer spending due to rising incomes and an acceleration effect from an expansion in investment spending due to rising aggregate demand (Sheikh M-A., 1980). The agricultural population causes the agricultural equipment. This human capital acts positively on equipment because agricultural equipment is essential to improve agricultural production. Otherwise, agricultural equipment is the technology to increase the added value. In turn, agricultural equipment also causes real agricultural added value.

Chart 1 Rate of change in real agricultural value added (lnvaar)



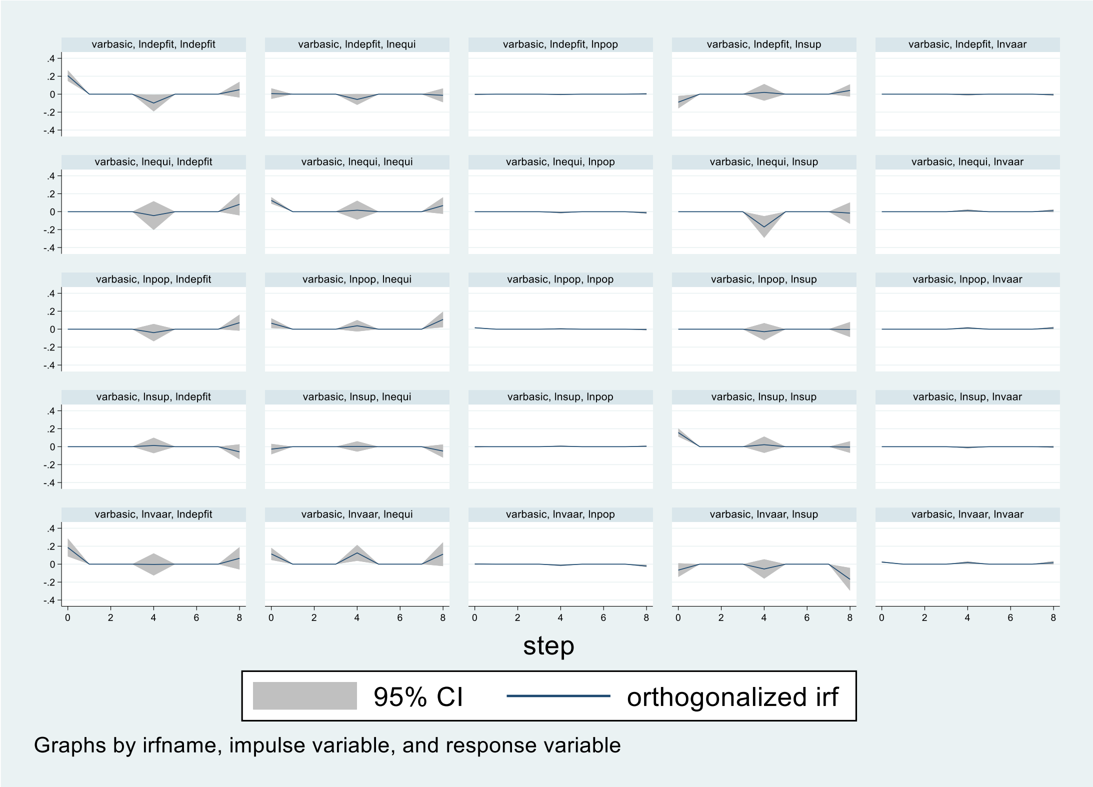
Source: built by the author, extracted from linear programming under R studio version 3.4.4 (2018-03-15) using data from FAO, Countrysat, BM.

The rate of change in real agricultural value added for the period 2005-2016 records the best score in terms of overall increase in real agricultural value (lnvaar) than those for the periods 1990-2016 and 1990-2004. This result explains, however, the impact of the adoption of the agricultural orientation law (LOA, 2005) and the agricultural development policy (PDA, 2013). This incident had a positive effect on the growth of real agricultural added value. On the other hand, following the application of the structural adjustment policy (PAS, 1980), radical economic and financial measures recorded in annual or multiannual programs called "structural adjustment plans" and the master plan of the 1990s- 2004 (Chart 1) had a negative impact on real agricultural added value. This means that agricultural policies are essential to improve the increase in real agricultural value added without which the sector would be less productive. This period resulted in a drastic decrease in the real agricultural value added of (-1.9%) compared to the average overall growth rate over all of our observations from 1990-2016 (0.79%) and also less good than that of the agricultural policy period (1.9%).

4.2.4 Pulse function

Graph 2 functions of impulse responses

The graphs below represent the responses to shocks on the structural residuals of the 5 variables of the model.



Source: built by the author, extracted from linear programming under R studio version 3.4.4 (2018-03-15) using data from FAO, Countrysat, BM.

A positive shock on agricultural current public expenditure translates into a negative effect and a positive effect on the latter. This shock has no impact on the active agricultural population and positive on the real agricultural value added, but it causes a negative shock at the start and positive on the agricultural area. There is a negative effect of current public agricultural expenditure on agricultural equipment.

Agricultural equipment reflects a negative and positive shock on agricultural current public expenditure respectively. The effect obtained on itself is a positive shock, but the shock obtained on the agricultural area is negative and weakly positive on the real agricultural value added.

The active agricultural population acts negatively and positively on current public agricultural expenditure, but we note that the increase in the agricultural population increases agricultural equipment. This shock thus leads to a decrease in the agricultural area and a significant positive shock on the value added and the agricultural population.

The agricultural area calls for an increase in current public agricultural expenditure, respectively, or a decrease in this area leads to a decrease in agricultural equipment. However, its sensitivity is positive on the real agricultural added value and on the active agricultural population and it has a positive impact on itself.

A positive effect of the real agricultural value added reflects an increase in current public agricultural expenditure, agricultural equipment and a low positive sensitivity on itself. This shock is negative on the agricultural area and on the agricultural population.

4.2.5 Variance decomposition

The variance decomposition explains the sensitivity of the shocks that affect each innovation. Thus, the variance of the forecast error of the real agricultural value added is due to 100% of its own innovations from the first to the fourth year. Over the 21-year horizon, 60% due to innovation in real agricultural added value, and 40% on average comes from innovations in current agricultural expenditure, area, labor force and agricultural equipment. Indeed, its results are consistent with those obtained on the impulse functions above.

CONCLUSION

In conclusion, the lndepfit, the sup act positively on the VAAR in accordance with the empirical work of (Romer, 1990; Barro, 1990; Rajhi T., 1993; Artus P. and Kaabi M., 1993) which demonstrated the positive link between public spending and economic growth. These conclusions are also supported by Barro (1990), Tenou (1999) and Nubukpo K. (2003) who concluded that public spending has an impact on economic growth. These results were also confirmed by (Benin et al, 2009), (Ezzahra F MENGOUB, 1994). While lndepinvit, lnpop, lnequi negatively vary short-term VAAR unlike short-term elasticity, lndepinvit, sup, pop, equi have a positive effect on VAAR. The finding reveals that agricultural public expenditure in the long term to influence the growth of agricultural value added. This is why the contribution of agriculture to economic growth has been a central concern since the work of Kuznets (1971) and economic theory on the measurement of productivity dating back to the work of Tinbergen J. (1942) and Solow R. (1957). Since then, this discipline has developed considerably, in particular following the major contribution of Dale W. Jorgenson (1995), Zvi G. (1987) and Diewert W. Erwin (1980).

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